DATA SHEET

One (1) fiber Detachable HDMI Extender, HDFX-200-TR

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Description

New optical HDMI extender, HDFX-200-TR consists of transmitter module and receiver module, each of which has one (1) LC connector and is designed compact enough to be fitted into various installation environments.

It enables to transmit the uncompressed HDMI up to WUXGA (1920x1200) at 60Hz refresh ratio or 1080p at 60Hz, avoiding any tricks like scaling or data compression for lessening a burden of data transmission.

The Optical HDMI extender, HDFX-200-TR offers extension of digital video of HDMI 1.3a up to 300 (985feet) over one (1) LC multi-mode fiber(50㎛). It is an all-fiber extension product, no copper connection like CAT5 or 6e between transmitter and receiver, installed in one (1) LC optical fiber for connection.

Optical technology makes the HDMI transmission stretch the performance beyond limitation of copper wire extension with various benefits of long distance, crystal-clear data, negligible RFI/EMI and elimination of costly distribution amplifiers unlike in analog extension.

HDFX-200-TR has HDMI receptacle and provides intermediate cable to be connected to various types of HDMI connectors. It passes CEC, EDID, and HDCP for better installation flexibility and is certified FCC and CE standards for EMI/RFI emission.

The shipping items are shown as follows;

1) One (1) Transmitter (Tx) and One (1) Receiver (Rx)
2) Two (2) DC +5V 1A power adapter
3) Two (2) HDMI copper cable (30cm)
4) User's Manual

※ Other options – contact with sales office

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Features

- Extends WUXGA (1920x1200) at 60Hz (1.65Gbps/ch) or 1080p at 60Hz (36bit, 2.25Gbps/ch)
- Transmits HDMI data up to 300m (985feet) over one (1) LC multi-mode fiber
- Has HDMI receptacle and provides intermediate cable for flexible installation
- Supports HDMI1.3 up to 36-bit color depth
- Complies with CEC, EDID & HDCP1.2
- Certifies FCC and CE standards for EMI/RFI emission
- Compliant with Class 1 LASER Eye Safety
- Includes two (2) +5V DC power adapters for the transmitter and receiver

Applications

- Digital HD-TV of types of LCD, PDP, projection and projectors for Home or Commercial Entertainments
- Digital HD-TVs for industrial applications such as medical appliances, aero traffic control, factory, conference room, auditorium and bank
- Digital FPDs and projectors in conference room and auditorium
- Kiosk with digital FPDs showing full motion graphic displays from remote systems
- HD-TVs for information display in public sites
- LED signboards in streets or in stadiums

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Technical Specifications

	Parameter	Specifications	Remarks
Components	Laser diodes in Tx module	InGaAs/InP 850nm/ 1310nm laser diode	
	Photo diodes in Tx module	InGaAs/InP PIN type photo diode	
	Photo diodes in Rx module	InGaAs/InP PIN type photo diode	
	Laser diodes in Rx module	InGaAs/InP 1550nm laser diode	
Electrical	Input and Output signals	TMDS level	
	Data Transfer Rate	Max. 1.65Gbps	
	Total Jitter at the end of Rx output	Max. 300 ps	
	Skew inter-channels	Max. 10ns	
Optical	Link Power Budget	Min. 10.0 dB	
Mechanical	Module dimension (WDH)	39 x 55 x 14.5mm	
Connect	Optical Connector	LC/PC connector	
	Electrical connector type from modules and to HDTVs	HDMI receptacle	
	Recommended fiber	50um Multi-mode Glass fiber	
External Power	Input	100~240V, 50~60Hz	
	Output	5V, 1A	

Absolute Maximum Ratings

Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. These are absolute stress ratings only. Functional operation of the device is not implied at these of any other conditions in excess of those given in the operational sections of the datasheet. Exposure to absolute maximum ratings for extended periods can adversely affect device reliability.

Parameter	Symbol	Min	Max	Unit
Supply Adapter Voltage	V_{CC}	-	6.5	V
Operating Temperature	T_{OP}	-10	50	°C
Operating Relative Humidity	RH_{OP}	5	80[1)]	%RH
Storage Temperature	Tstg	-20	75	°C
Storage Relative Humidity	RHstg	5	95[2)]	%RH

Note
1), 2) Under the conditions of No drops of dew

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Operating Conditions

- **Transmitter module: HDFX-200T**

	Parameter	Symbol	Min	Typ.	Max	Units
Power Supply	Supply Voltage	V_{CC}	4.5	5.0	5.5	V
	Supply current	I_{TCC}	400	460	580	mA
	Power Dissipation	P_{TX}	1.8	2.3	3.19	W
	Power Supply Rejection (Note1)	PSR	-	50	-	mV_{p-p}
TMDS	Data Output Load	R_{LD}		50		Ω
	Graphic Supply Voltage (Note2)	GV_{CC}	+ 3.1	+ 3.3	+ 3.5	V
	Single-Ended High Level Input Voltage	GV_{IH}	GV_{CC} - 0.01	GV_{CC}	GV_{CC} + 0.01	V
	Single-Ended Low Level Input Voltage	GV_{IL}	GV_{CC} - 0.6	-	GV_{CC} - 0.4	V
	Single-Ended Input Swing Voltage	GV_{ISWING}	0.4	-	0.6	V
Optical Link (Note3)	TX					
	Output Optical Power	P_o	-9	-7	-4	dBm
	Wavelength	λ	840	850	860	nm
	Output Optical Power	P_o	-6	-3	-1	dBm
	Wavelength	λ	1290	1310	1330	nm
	Differential output swing	$V_{diffout}$	600	800	1000	mV
	RX					
	Sensitivity@3.125Gbps (Note4)	P_O	-17	-20		dBm
	Receiving Wavelength	Λ	1530	1550	1570	nm
	Link Power Budget	P_b	11	17		dB
	Differential input swing	V_{difin}	300		2400	mV

Note1. Tested with a $50mV_{p-p}$ sinusoidal signal in the frequency range from 500 Hz to 500 MHz on the V_{CC} supply with the recommended power supply filter in place. Typically less than a 0.25 dB change in sensitivity is experienced.
Note2. Graphic Supply Voltage is regulated reference voltage for signal processing in modules
Note3. Measure signals at the end of 2 meter 50/125um MMGOF
Note4. Use PPG (Pulse pattern Generator) source with jitter 50ps

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- **Receiver module: HDFX-200-R**

	Parameter	Symbol	Min	Typ.	Max	Units
Power Supply	Supply Voltage	V_{CC}	4.5	5.0	5.5	V
	Supply current	I_{TCC}	330	370	470	mA
	Power Dissipation	P_{TX}	1.49	1.85	2.59	W
	Power Supply Rejection (Note5)	PSR	-	50	-	
TMDS	Data Input Load	R_{LD}		50		Ω
	Graphic Supply Voltage (Note6)	GV_{CC}	+ 3.1	+ 3.3	+ 3.5	V
	Single-Ended Output Swing Voltage (Note7)	GV_{ISWING}	0.2	-	0.4	V
Optical Link	TX					
	Output Optical Power	P_o	-6	-3	1	dBm
	Wavelength	λ	1530	1550	1570	nm
	Differential output swing	$V_{diffout}$	600	800	1000	mV
	RX					
	Sensitivity@3.125Gbps(Note8)	P_O	-16	-19		dBm
	Receiving Wavelength	Λ	840	850	860	nm
	Signal Detector-Dessert	SD_{DE}	-16	-19		dBm
	Signal Detector-Assert	SD_A	1290	1310	1330	dBm
	Differential input swing	V_{difin}	300		2400	mV

Note5. Tested with a 50mV_{p-p} sinusoidal signal in the frequency range from 500 Hz to 500 MHz on the V_{CC} supply with the recommended power supply filter in place. Typically less than a 0.25 dB change in sensitivity is experienced.
Note6. Graphic Supply Voltage is regulated reference voltage for signal processing in modules
Note7. TMDS outputs are coupled in AC
Note8. Use PPG (Pulse pattern Generator) source with jitter 50ps

Recommended specifications of fiber-optic cable

Parameters	Conditions	Specifications
Fiber Type		50μm Multi-mode Graded Index Glass Fiber
Modal Bandwidth	λ = 850nm	Min. 500 MHz km
Fiber Cable Attenuation	λ = 850nm	Max. 2.5dB/km
Extension Distance		10 – 1650ft (500 meters)
No. of Ferrules	Duplex LC	2 ferrule
Skew		Max. 0.4ns
Insertion Attenuation		Max. 0.5dB
Total Optical Attenuation	In 330 ft (100 meter) extension	Max. 1.5dB

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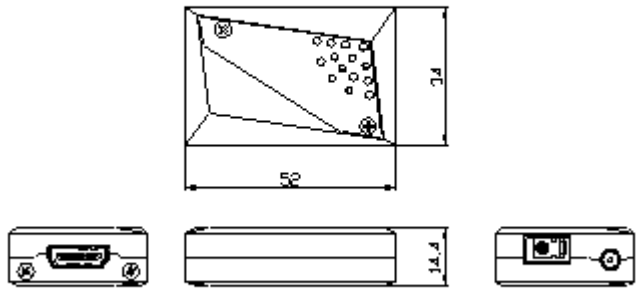
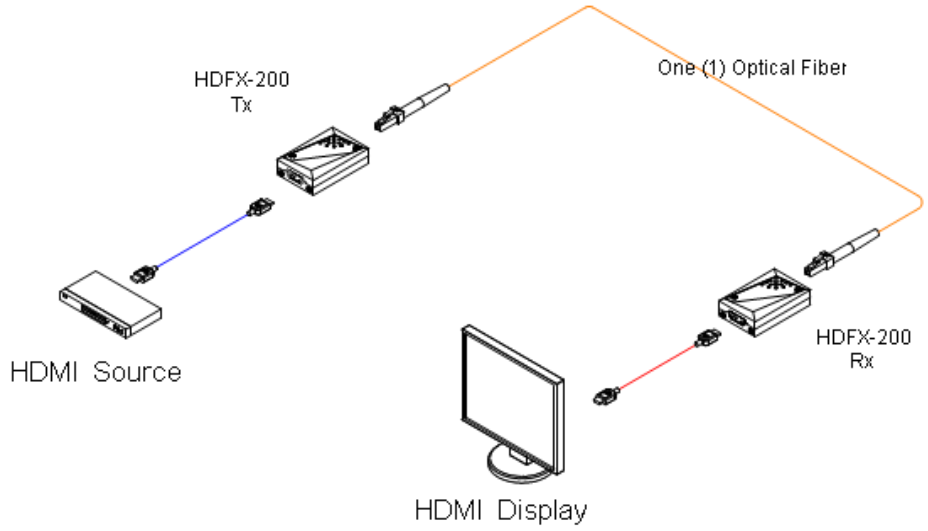
Drawing of Module

Dimension [Unit: mm]



Note: The transmitter, HDFX-200-T and the receiver, HDFX-200-R have the same mechanical dimensions

Drawing of Cable Connection



HDMI Pin Description

No	Pin Assignment	Functional Description
1	TMDS2+	TMDS Data Signal Channel 2 Positive
2	TMDS2 Shield	TMDS Data Signal Channel 2 Shield
3	TMDS2-	TMDS Data Signal Channel 2 Negative
4	TMDS1+	TMDS Data Signal Channel 1 Positive
5	TMDS1 Shield	TMDS Data Signal Channel 1 Shield

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6	TMDS1-	TMDS Data Signal Channel 1 Negative
7	TMDS0+	TMDS Data Signal Channel 0 Positive
8	TMDS0 Shield	TMDS Data Signal Channel 0 Shield
9	TMDS0-	TMDS Data Signal Channel 0 Negative
10	TMDS Clock+	TMDS Clock Channel Positive
11	TMDS Clock Shield	TMDS Clock Channel Shield
12	TMDS1Clock-	TMDS Clock Channel Negative
13	CEC	Consumer Electronics Control
14	Reserved	Not used
15	SCL	HDCP/DDC communication clock
16	SDA	HDCP/DDC communication data
17	DDC/CEC Ground	DDC/CEC shield
18	+5V Power	5 V Input for Transmitter for Host
		5 V Output for Monitor from Receiver
19	Hot Plug Detect	Signal is driven by monitor to enable the system to identify the presence of a monitor

Reliability Test

We have two kinds of test criteria for a continuous improvement of characteristics of Optical HDMI interface module by our failure mode analysis program

1) Temperature & Humidity test
2) EMC test - FCC

◆ **Temp. & Humidity Test**

Items	Test	Conditions	Duration	Sample Size
Operation Test	Operating at each Temperature (1)	-10 ~ 60 °C (step: 10 °C)	30 min. (each Temperature)	N = 5
Storage Test	Low Temperature	Ts(2) = -20 °C	96HR	N = 5
	Low Temperature	Ts = 75 °C RH(3): 85%	96HR	N = 5

Note 1) Evaluate display quality of Full HD TV connected to Graphic signal Generator (Quantum Data: GE-802B) at each temperature.
Note 2) Ts: Storage Temperature
Note 3) RH: Relative Humidity

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◆ **EMC Test**

1) EMI: Meet *FCC class A* (ICES-003) and *CE class A*

STANDARDS		CONDITIONS
EN 55 022 (CISPR22) **FCC; PART 15 SUBPART B**	CE (Conducted Emission) & RE (Radiated Emission)	Meet Class A
EN 61000-3-2 (IEC 61000-3-2)	Harmonics	Meet Class A
EN 61000-3-3 (IEC 61000-3-3)	Flickers	

Laser Safety Information

<US FDA CDRH Class 1>

Ensure to avoid exposure of human eyes to high power laser diode emitted laser beams.

Especially do not look into the laser diode or the collimated laser beam when the diode is activated.

US FDA CDRH Class 1, IEC60950, 60825-1.

Terminology

ANSI	American National Standards Institute
AVI	Auxiliary Video Information
CEC	Consumer Electronics Control
DDC	Display Data Channel
DVD	Digital Versatile Disc
DVI	Digital Visual Interface
E-DDC	Enhanced Display Data Channel
E-EDID	Enhanced Extended Display Identification Data
HDCP	High-bandwidth Digital content Protection
HDMI	High-Definitions Multimedia Interface
HDTV	High-Definition Television
SMPTE	Society of Motion Picture and Television Engineers
STB	Set-Top Box
TMDS	Transition Minimized Differential Signaling
VESA	Video Electronics Standards Association

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